

## CLAIMS

What is claimed is:

- 1 1. A semiconductor electrochemical biosensor array (SEBA), comprising:  
2 an array of electrodes to receive sample material from an external source;  
3 and  
4 sensor circuitry, coupled to the array of electrodes, having a plurality of  
5 sensor cells to analyze the sample material received at the array of electrodes.
- 1 2. The SEBA of claim 1 further comprising:  
2 a decoder, coupled to the sensor circuitry, to select which of the plurality  
3 of sensor cells are to be used to analyze the sample material; and  
4 control circuitry, coupled to the sensor circuitry to enable a SEBA user to  
5 activate a combination of electrodes and sensor cells.
- 1 3. The SEBA of claim 2 further comprising:  
2 a function generator, coupled to the control circuitry, to generate signals  
3 for measurements; and  
4 reference elements coupled to the sensor circuitry.
- 1 4. The SEBA of claim 1 wherein the array of electrodes comprises a plurality  
2 of triple electrode configurations each coupled to a sensor cell.

1 5. The SEBA of claim 4 wherein the triple electrode arrangement comprises:  
2 a common electrode;  
3 an active electrode; and  
4 a passive electrode.

1 6. The SEBA of claim 5 wherein each of the sensor cells comprise:  
2 an amplifier, having inputs coupled to an active electrode an a passive  
3 electrode, to provide a variable gain based upon a type of analysis being  
4 performed;  
5 a plurality of switches coupled to the amplifier and  
6 a control register to control the plurality of switches.

1 7. The SEBA of claim 6 wherein the amplifier receives one or more select bits  
2 to in order to set a gain level.

1 8. The SEBA of claim 6 wherein the sensor cells are configured to implement  
2 Charge Perturbation Signature (CPS) analysis.

1 9. The SEBA of claim 6 wherein the sensor cells are configured to implement  
2 Impedance Spectroscopy (IS) analysis.

1 10. The SEBA of claim 6 wherein the sensor cells are configured to implement  
2 Cyclic Voltammetry (CV) analysis.

- 1 11. The SEBA of claim 6 wherein the sensor cells are configured to implement  
2 potentiometric measurements.
- 1 12. The SEBA of claim 1 wherein the sample material is chemical samples.
- 1 13. The SEBA of claim 1 wherein the sample material is biological samples.